CLAIMS

What is claimed is:

1. An apparatus, comprising:

a base of a photonic device;

a multiple layer coating disposed on the base, wherein the multiple layer coating includes a first layer of silver (Ag) having a physical thickness of at least approximately one hundred nanometers, a second layer of silicon dioxide (SiO_2) having an optical thickness of a first percentage of a quarter of a wavelength of interest within a band of wavelengths of interest, a third layer of silicon (Si) having an optical thickness of a second percentage of a quarter of the wavelength, and a fourth layer of silicon oxynitride (SiO_xN_y) having an optical thickness of a third percentage of a quarter of the wavelength and a ratio of N_y in the fourth layer of SiO_xN_y includes values within a range from approximately sixty percent N_y to twenty percent N_y.

2. The apparatus of claim 1, wherein the second layer of SiO_2 includes a physical thickness of approximately two hundred seventy nanometers and the third layer of Si includes a physical thickness of approximately fifty nanometers.

3. The apparatus of claim 2, wherein the fourth layer of SiO_xN_y includes physical thickness within a range from approximately one hundred nanometers to one hundred ten nanometers.

4. The apparatus of claim 1, wherein the base includes a substrate.

5. The apparatus of claim 4, wherein the substrate includes silicon.

6. The apparatus of claim 1, wherein the optical thickness of the second layer of SiO_2 is approximately one quarter of a wavelength of interest within the band of wavelengths of interest.

7. The apparatus of claim 1, wherein the first layer of Ag includes a physical thickness of at least approximately one hundred nanometers.

8. The apparatus of claim 1, wherein the optical thickness of the third layer of Si is of approximately 0.41 quarter of the wavelength of interest within the band of wavelengths of interest.

9. The apparatus of claim 1, wherein the optical thickness of the fourth layer of SiO_xN_y is an approximately 0.44 quarter of the wavelength of interest within the band of wavelengths of interest.

10. An apparatus, comprising:

a base of a photonic device;

a multiple layer reflective coating disposed on the base, wherein the multiple layer reflective coating includes a stress tunable from tensile to compressive and a shape tunable from convex to concave.

11. The apparatus of claim 10, wherein the multiple layer coating includes a layer of silver (Ag) disposed on the base having a physical thickness of at least approximately one hundred nanometers, a layer of silicon oxide (SiO_2) disposed on the layer of Ag having an physical thickness of approximately two hundred seventy nanometers, a layer of silicon (Si) disposed on the layer of SiO_2 having a physical thickness of approximately fifty nanometers, and a layer of silicon oxynitride (SiO_xN_y) disposed on the layer of Si having a ratio of N_y tunable within a range from approximately sixty percent N_y to twenty percent N_y.

12. The apparatus of claim 11, wherein the layer of SiO_2 includes an optical thickness of approximately one quarter of a wavelength of interest, the layer of Si includes an optical thickness of approximately 0.41 quarter of the wavelength, and the layer of SiO_xN_y includes an optical thickness of approximately 0.44 quarter of the wavelength.

13. The apparatus of claim 12, wherein the layer of SiO_xN_y includes a physical thickness within a range from of approximately one hundred nanometers to one hundred ten nanometers.

14. The apparatus of claim 11, wherein the multiple layer coating further comprises a refractive index tunable within a range from approximately 1.44 to 2.0.

15. The apparatus of claim 11, wherein the multiple layer coating exhibits substantial wavelength independence within a band of wavelengths of interest.

16. An apparatus, comprising:

a base of a photonic device;

a multiple layer coating disposed on the base, wherein the multiple layer coating includes a tunable index of refraction across a range of angles of incidence of interest and a reflectance greater than ninety-nine percent over the range of angles of incidence.

17. The apparatus of claim 16, wherein the multiple layer coating includes a reflective film disposed on the base having a physical thickness of at least approximately one hundred nanometers, a layer of silicon oxide (SiO_2) disposed on the reflective layer having a physical thickness of approximately two hundred seventy nanometers, a layer of silicon (Si) disposed on the layer of SiO_2 having a physical thickness of approximately fifty nanometers, and a layer of silicon oxynitride (SiO_xN_y) disposed on the layer of Si having an optical thickness of approximately forty-four one-hundredths of one quarter of a wavelength of interest and a ratio of N_y tunable within a range from approximately sixty percent N_y to twenty percent N_y.

18. The apparatus of claim 16, wherein the multiple layer coating exhibits high reflectivity at wavelengths of interest within a band of wavelengths.

19. A system, comprising:

a micro-electromechanical system (MEMS) platform; and

a mirror coupled to the MEMS platform, wherein the mirror includes a multiple layer coating having a stress tunable from tensile to compressive and a shape tunable from convex to concave.

20. The system of claim 19, wherein the multiple layer coating includes a layer of silver (Ag) disposed on the base having a physical thickness of at least approximately one hundred nanometers, a layer of silicon oxide (SiO_2) disposed on the layer of Ag having an optical thickness of approximately one quarter of a wavelength of interest, a layer of silicon (Si) disposed on the layer of SiO_2 having a physical thickness of approximately fifty nanometers, and a layer of silicon oxynitride (SiO_xN_y) disposed on the layer of Si having a ratio of N_y tunable within a range from approximately sixty percent N_y to twenty percent N_y.

21. The system of claim 20, wherein the layer of SiO_xN_y includes an optical thickness within a range from of approximately one hundred nanometers to one hundred ten nanometers.

22. The system of claim 21, wherein the layer of SiO_xN_y includes physical thickness within a range from approximately one hundred nanometers to one hundred ten nanometers.

23. An apparatus, comprising:

a base of a photonic device;

a multiple layer coating disposed on the base, wherein the multiple layer coating includes a first layer of gold (Au) having a physical thickness of at least approximately one hundred nanometers, a second layer of dielectric material having an optical thickness of a first percentage of a quarter of a wavelength of interest within a band of wavelengths of interest, a third layer of silicon (Si) having an optical thickness of a second percentage of a quarter of the wavelength, and a fourth layer of silicon oxynitride (SiO_xN_y) having an optical thickness of a third percentage of a quarter of the wavelength and a ratio of N_y in the fourth layer of SiO_xN_y includes values within a range from approximately sixty percent N_y to twenty percent N_y.

24. The apparatus of claim 23, wherein the second layer of dielectric material includes a layer of silicon dioxide (SiO_2).

25. The apparatus of claim 24, wherein the second layer of dielectric material includes a layer of silver dioxide ($Ag\ O_2$) disposed on the layer of SiO_2.

26. The apparatus of claim 24, wherein the second layer of dielectric material includes a layer of silver dioxide (AgO_2) disposed between the SiO_2 and the layer of and the layer of Au.